

# ATOMIC ENERGY

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Dear Sir:

A portion of the Weldon Springs, Mo., Ordnance Works is to be occupied by one of the development activities of the USAEC, with preliminary engineering studies now underway. USAEC use of Weldon Springs means acquisition of the section previously disposed of to the U. of Missouri (which was subject to recapture).

Effects on structures of atomic weapons, with data to be assembled on stresses, etc., are part of the Eniwetok atoll atomic bomb tests, the American Institute of Architects has now been advised by the USAEC. The statistics, useful in establishing design criteria, will supplement data previously obtained from weapons explosions.

Consolidation of the Kelley-Koett Manufacturing Co., of Covington, Ky., and Cincinnati, O., with Tracerlab, Inc., Boston, Mass., has now taken place. Established in 1900, Kelley-Koett is one of the oldest X-ray equipment manufacturers in the U. S.; it makes nucleonic products in Cincinnati, in an instrument division. Tracerlab, whose main activity started in 1946, is one of the relatively few specialized nuclear equipment manufacturers in the U. S. Plans call for continued operation of both firms under present management.

Support of both physical research, and medical and biological research, with USAEC grants, in terms of dollar volume, will be increased in the USAEC's 1952 fiscal year budget, Gordon Dean, USAEC chairman said in Washington last fortnight. Such support is a "fairly small proportion of the USAEC's budget", Dean observed. (This NEWSLETTER has pointed out that such support is a disproportionately small amount, considering the over one billion dollar USAEC spending in the current fiscal year.)

A new \$45 million project, in the atomic energy program, is to be built northwest of Denver, Colo. Under the direction of the USAEC's Santa Fe Operations Office, which handles research, development, testing and production of atomic weapons, the project will be operated by the Dow Chemical Co., Midland, Mich. Dr. L. A. Matheson, of Dow's physical research laboratory, will be technical director of the new project. Site selection was governed (the USAEC said) by military invulnerability; good weather; operational values; and access to a population center. The Austin Company, Cleveland, will be the prime construction contractor.

Canadian uranium producers will now get a development allowance of \$1.25 per pound of contained uranium oxide during the first three years of production, according to W. J. Bennett, president of the Canadian government's Eldorado Mining and Refining, Ltd., the firm which controls Canada's uranium production. This new allowance has the effect of raising the present maximum price of uranium oxide (ores grading 0.25% or less) from \$6.00 to \$7.25 per pound. (In Washington last week, the USAEC said the US's uranium output now exceeded Canada's. This makes the world's "big three" uranium producers, in order of output, (1) Belgian Congo, (2) U. S. (3) Canada. Czechoslovakia and other Iron Curtain countries also produce substantial quantities of uranium ores.)

NUCLEAR SUBJECTS: INSTITUTE OF RADIO ENGINEERS 1951 CONVENTION...

A Symposium on Nuclear Reactors and a session on Nuclear Science, at this IRE Convention, held in New York last week, heard the following papers, in abstract here:

SYMPOSIUM: NUCLEAR REACTORS-Alvin M. Weinberg, Oak Ridge National Laboratory, Oak Ridge spoke on "What is Nuclear Engineering?". Since the discovery of nuclear fission, no useful mechanical energy has been extracted from uranium principally because of the many technological difficulties encountered, the lack of motivation, and the enormous economic backing necessary for such a development (Dr. Weinberg explained). The deteriorating post-war political situation has now supplied the motivation, and the necessary economic aid. Consequently, the investigation of military requirements for atomic powered vehicles, more nuclear fuel, and more powerful bombs, is being expedited. When the world returns to peaceful ways, nuclear technology can be applied solely for peaceful purposes.

D. J. Hughes, Brookhaven National Laboratory, L.I., spoke on "The Reactor as a Research Tool". The chain reacting pile is extremely useful as a research tool (he said) because it produces high intensities of neutrons of a wide range of energies. Many methods are used to select neutrons of particular velocities for specific measurements, such as mechanical shutters, crystal diffraction, and mirrors. The highest energy neutrons (about 10 Mev) are those emitted in the uranium fission, and lower energies are produced by collisions of the fission neutrons with moderator nuclei (graphite or heavy water).

Frederick P. Cowan, Brookhaven National Laboratory, discussed "Background Radiation Monitoring for Control of an Air-Cooled Pile". Since small concentrations of radioactive argon are discharged from an air-cooled pile (Cowan stated), radiation monitoring stations are desirable in the vicinity. Operation of the pile is based on the records of such stations, and on meteorological predictions of atmospheric dilution. Detection devices utilized in the Brookhaven stations include several G-M counters, and ionization chamber with associated electrometer and a continuous dust monitor. Data is recorded photographically and on charts. Normal background amounts to about  $\frac{1}{2}$  mr per day on the ion chamber, 30 c/m on a thin glass-walled G-M tube 10-inches long, and 15 c/m on a similar tube with  $\frac{1}{2}$ -inches lead shield. Peaks due to rainfall and the effect of snow cover are clearly apparent. Sizable peaks in natural dust activity are caused by temperature inversions. Only small increases in the average background beyond BNL site boundary result from operation of the pile.

J. E. Binns, Brookhaven National Laboratory, spoke on "Instrumentation in the Brookhaven Nuclear Reactor". The useful product of the nuclear reactor is neutrons; the unwanted by-products are heat, dangerous radiations, and dangerous radioactive substances. Instrumentation has been provided for the measurement and control of these products (Binns explained), as well as for the measurement of certain parameters used in the experimental study of the pile. Considerations of safety are paramount.

SESSION: NUCLEAR SCIENCE:- "A Delayed Coincidence Scintillation Spectrometer", was described by F. K. McGowan, Oak Ridge National Laboratory, Oak Ridge. An instrument employing anthracene phosphor, 5,819 photomultipliers, wide-band amplifiers, fast coincidence circuits, linear amplifiers, and differential pulse-height selectors, was explained in some detail, as well as typical experiments done with it.

"Timing Unit and Pulse Deflector Generator for 145-Inch Synchro-Cyclotron", described by E. M. Williams, et al., Carnegie Institute of Technology, Pittsburgh, concerned this unit at Carnegie Tech, including details of the timing circuits, a novel cascade cavity-enclosed hydrogen-thyratron pulser, and results from tests with the device.

"Design and Construction of a Billion-Volt Linear Electron Accelerator", a paper by Marvin Chodorow, et al., Microwave Laboratory, Stanford University, Stanford, concerned the design and construction of the first 80-feet of a 220-foot linear electron accelerator to produce billion-volt electrons.

Two other papers in this session: "Use of Nuclear Resonance with RF Techniques to Measure and Regulate Magnetic Fields", by H. A. Thomas, National Bureau of Standards; "A High-Precision Magnetic Field Measuring Instrument", by R. W. Kane, et al., Varian Associates, San Carlos, Calif.

PRODUCTS, PROCESSES, & INSTRUMENTS...for nuclear work...

From The Manufacturers- Decimal Scalers, Models 100 and 110, provide true decimal representation on an electronic scale-of-100 with capacity extended by mechanical register. While the Model 100 is a basic Geiger-Muller scaler devoid of nonessential features, and with a relatively low cost, the Model 110 is a universal scaler suitable for both Geiger-Muller or scintillation work. On both instruments, a single high voltage control simplifies operation and prevents inadvertent over-voltaging of G-M tubes. Single continuous control is provided from 0-2500 volts. Maximum continuous counting rate is 1,000 cps. Resolution of random pulse pairs is said to be better than 7-microseconds. Accessory outlets are provided for external time clock, timer, loudspeaker, or output pulse per count to drive count rate meter or counting rate computer and recorder. --Berkeley Scientific Corp., Richmond, Calif.

Model 561-20 Dynamic Condenser Electrometer, designed especially for nuclear research work, has measuring ranges and operating flexibility suitable for general laboratory measurement of small D.C. currents and voltages in high resistance circuits. Special features of this instrument are said to be its stability of calibration and high response speed. High amplifier gain and high feedback ratio make calibration independent of component charges and supply voltage variations. --Loudon Instruments, Inc., Chicago 37, Ill.

Model SU-6 Pocket Radiac is an ionization chamber type survey meter with a simple logarithmic scale range. The instrument is normally supplied with a full scale range of 25 roentgens per hour, but will also be available with a range of 500 roentgens per hour. Shaped like an electric shaver, the instrument may be carried in a pocket or handbag. Hearing aid components are used throughout; total weight is about 1½-pounds. --Tracerlab, Inc., Boston 10, Mass.

Tagged biosynthesized chemicals, as well as other radioactive carbon compounds, have now been made available from the newly set up chemistry laboratory of Nuclear Instrument and Chemical Corp., Chicago 10, that firm recently announced.

Developmental & Experimental Work- A wide variety of solutions of organic compounds known or suspected to have fluorescent properties has been examined by E. H. Belcher, of the Royal Cancer Hospital (London, Eng.) in an effort to find a suitable liquid medium to replace the crystalline phosphors presently used in scintillation counters for gamma-ray measurements. Of the systems investigated, aa dinaphthyl in benzene was found by this researcher to be the most promising. He states that it is superior to p-terphenyl in benzene, under the conditions of his experimental work, and is carrying on further work with aa dinaphthyl and its derivatives.

Precast concrete provides excellent protection against atomic bombs, Arsham Amirikian, head designing engineer, Navy Bureau of Yards and Docks, recently told an American Concrete Institute meeting in San Francisco. He suggested that prefabrication of the readily assembled framing units could be done at regional plants, and stockpiled at various points for immediate use in an emergency.

A modification of a coating of polyvinylchloride is said to provide some measure of shielding against ionizing radiation, according to Harry Grimshaw, whose firm, James North & Sons, Hyde (England) manufactures X-ray protective aprons, etc. The discovery is claimed to have been successfully tested by the British Ministry of Supply's Department of Atomic Energy.

New, constructive, industrial uses for fission products, through their large scale employment, are being investigated at Stanford Research Institute, Stanford, Calif., under a USAEC contract held by Stanford. Immediate objectives are to acquaint industrial firms with the characteristics of these fission products, which are a highly radioactive mixture of elements produced by uranium fission during the plutonium production process in reactors. Another objective is to obtain from industry some estimate of how they may be used. A descriptive booklet, "Industrial Utilization of Fission Products--A Prospectus for Management", may be obtained by writing Project 361, Stanford Research Institute, Stanford, Calif.

RADIOISOTOPES & IONIZING RADIATION...investigations & applications...

INDUSTRIAL- Applications of radioactive carbon to studies of carbon black dispersion in rubber were outlined by A. D. Kirshenbaum, Temple University, before the American Chemical Society Rubber Chemistry Division meeting in Washington recently. Visual observation of carbon dispersion was made possible by the use of C-14 and the standard autoradiographic technique, Kirshenbaum said. He used approximately 2 mg of C-14 for each 1100-gram batch of rubber mix. The C-14 was incorporated into the carbon black by six different methods, none of which had any noticeable effect upon the particle size of the carbon black. Most satisfactory was the heating of the carbon black to between 900-1000 degrees C., in the presence of radioactive carbon dioxide. Autoradiographs of cured and uncured rubber samples showed visible variations in carbon black distribution which agreed closely with the tensile test data. Kirshenbaum explained that a comparison of autoradiographs with photomicrographs of the same samples indicates that the autoradiographic technique is the superior method.

BIOLOGICAL- Experiments have been conducted by Hymer L. Friedell and James H. Christie, Dep't. of Radiology, University Hospitals, Cleveland, on the simultaneous injury, by ionizing radiation from phosphorous-32 and colloidal gold-198, of separate body structures or systems in male albino rats. An examination was also made of their interrelationship in producing death of the animal. These isotopes--phosphorous-32 and colloidal gold-198--were administered singly and in combination to the male albino rat. Results: It was clearly indicated (the experimenters state) that P-32 and colloidal gold-198, when administered in combination, act synergistically in their killing effect. They believe this related to the simultaneous injury of the reticuloendothelial system and the blood forming tissues.

Hafnium-181 has been studied by C. F. Kittle, E. R. King, et al., at the University of Kansas School of Medicine, Kansas City, and the Oak Ridge Institute of Nuclear Studies, Oak Ridge, in an attempt to determine its distribution in the body after the intravenous administration of its mandelate salt. The studies were made upon 17 rats who were sacrificed at intervals of 1,2,3,4,8, and 16 days. Results: It was found that 70 to 90% of the total activity was retained in the liver, spleen, the skeletal, muscular and pelt systems. Hafnium-181 in the blood was found chiefly (95%) in the plasma, and remained in appreciable amounts to 4-days. Seven percent of the total dose was excreted in 160-days, with more being eliminated in the urine than in the feces. On the basis of this experiment, these researchers feel that hafnium-181 sodium mandelate has little specific localization in the body to recommend its consideration for radiation therapy of individual organs or tissue.

Flavonoids as they effect radiation mortality in mice have been investigated by E. P. Cronkite, W. H. Chapman, and F. W. Chambers, Naval Medical Research Institute, Bethesda, Md. (Although various experimenters have reported flavonoids to be beneficial in the treatment of animals after exposure of the whole body to potentially lethal amounts of radiation, flavonoids were found to be useless for this purpose in this investigation.) A flavonoid compound from fruit was used. It was reported to contain quercitrin-like substances, 4%; eriodictin, 15%; chalcone hesperidin-glucose hesperidin 80%; and calcium phosphorous ash, 0.58%. Injections of the flavonoids in the mice were started 5-days before irradiation, and continued until the mice died, or for 15-days after irradiation. It was given 2 times per day, subcutaneously. The mice were given X-ray doses of 750, 850, 950, and 1050 r.; suitable control mice were used. Results: At the doses of radiation used, the compound was found not to give any protection. However, because of the non-toxicity of this substance, these experimenters recommend further investigation of flavonoids for radiation protection.

NOTES- "Radioisotopes in Industry", a five day conference, will be held at Case Institute, Cleveland, O., April 2-6, with the USAEC's cooperation. A \$50.00 fee will be charged for the session. Complete information may be obtained from J. R. Bradford, Radioisotopes Laboratory, Case Institute, Cleveland 6, Ohio. Purpose of the conference is to acquaint industry men with use of radioactive material in production and research.



ATOMIC PATENT DIGEST...latest U. S. applications & grants...

GRANTS- Radioactivity detector. A cylindrical wall and end plate form a closed ionization chamber, with the cylindrical wall one electrode of the chamber. A diaphragm window is in one of the end plates of the chamber, and an electron tube is mounted inside the chamber. An input resistance is so mounted in the chamber, and so connected to the grid of the tube, that a directional radioactivity detector of high sensitivity is thereby obtained. U. S. Patent 2, 544,928, issued Mar. 18, 1951; assigned to Industrial Nucleonic Devices, Tulsa, Okla.

APPLICATIONS- Separation of isotopes. A method is described for separating the isotopes of various chemical elements by diffusion of a solution through a suitable membrane. A substance containing the isotopes of the element to be separated is dissolved in a suitable solvent. The solution is then diffused through a membrane. The lighter isotopes diffuse faster than the heavier isotopes, and the diffusion may be repeated until any reasonable desired concentration is attained. For the separation of the isotopes of uranium, uranium nitrate, bromide, or chloride is dissolved in a suitable non-aqueous solvent in which complex molecules are not formed between the uranium and any water present. Solution of uranium compounds in such liquids as carbon tetrachloride, ether, acetic acid, and similar substances has this property. U. S. Pat. Application 357,386, assigned to Westinghouse Electric Corp., E. Pittsburgh. (Filed 9/19/40; published 3/6/51.)

Complexes of uranium and fluoro substituted beta diketones. The uranium complexes may be prepared by reacting an aqueous solution containing uranium in the tetravalent or hexavalent state with the substituted beta diketone. Examples of such beta diketones are trifluoroacetyl acetone, trifluoroacetyl pinacolone, etc. The uranium complex resulting will precipitate from the aqueous solution, and the precipitate may be separated, for example, by filtration. It may then be washed with water, and dried over a suitable drying agent. The uranium complex may be separated by the presence of a water immiscible organic solvent which will extract it. U.S. Patent Application 611,220, made by H. L. Schlesinger, Chicago, Ill., and H. C. Brown, Detroit, Mich. (Filed 8/17/45; published 3/6/51.)

(This application is further work by Schlesinger and Brown, along related lines, as above.) Trifluoro beta diketones have been discovered by reacting or condensing a ketone having an alpha hydrogen atom with an alkyl trifluoroacetate, preferably ethyl trifluoroacetate, in the presence of a suitable condensing agent and preferably also of an inert solvent, such as ethyl alcohol and xylene. Ketones condensed include acetone, methyl ethyl ketone, diethyl ketone, acetophenone, methyl isobutyl ketone, methyl cyclohexanone, and pinacolone. Sodamide and sodium alkoxides, preferably ethoxide or methoxide, are examples of suitable condensing agents. U. S. Patent Application 862,600, assigned to USAEC; H. L. Schlesinger and H. C. Brown, inventors. (Filed 4/16/46; published 3/6/51.)

BOOKS & OTHER PUBLICATIONS... in the nuclear field...

Advances in Biological and Medical Physics. Edited by John H. Lawrence, and Joseph G. Hamilton. Volume II. (Vol. I issued 1948) Contents: Biological effects of radiations; radioautographic technique; carcinogenic effects of radiation; in vivo studies with radioisotopes; radioactive isotopes in clinical diagnosis; biophysical approaches to atherosclerosis; radioactive sulphur and its applications; carbon isotopes in studying animal metabolism; molecular exchange and blood perfusion through tissue regions.--Academic Press, Inc., New York 10, N.Y. (\$7.80)

Uranium, Radium, and Thorium, by J. W. Clark. A preprint from the 1949 "Minerals Yearbook", of the U. S. Bureau of Mines. 13 pages --Superintendent of Documents, Washington 25, D. C. (5¢)

Sincerely,

The Staff,  
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